

HONEYCOMB SOLAR THERMAL COLLECTOR

OPPORTUNITY

Why is GSA interested in the Honeycomb Solar Thermal Collector (HSTC)?

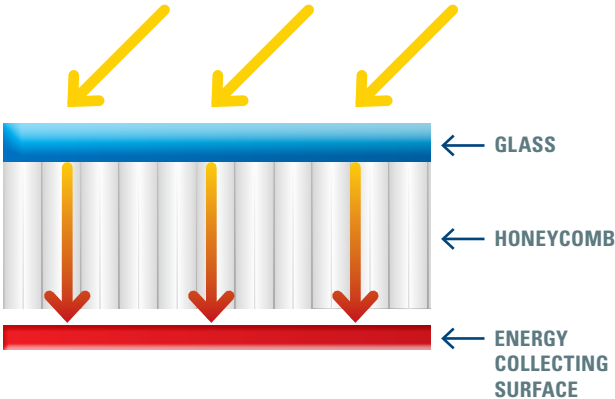
30% SOLAR HOT WATER (SHW) REQUIRED TO COMPLY WITH EISA<sup>1</sup>

TECHNOLOGY

How does HSTC differ from typical flat-plate collectors?

MINIMIZES HEAT LOSS

Honeycomb insulating layer allows solar energy to enter the collector while reducing heat loss from conduction



M&V

Where did Measurement and Verification occur?

NATIONAL RENEWABLE ENERGY LABORATORY measured performance of an HSTC system at two demonstration sites: the Major General Emmett J. Bean Federal Center in Indianapolis; and the GSA Regional Headquarters Building in Auburn, Washington

RESULTS

How did HSTC perform in M&V?

COMPARABLE

TO OTHER FLAT PLATES FOR STANDARD DHW  
In SHW systems without a storage tank, HSTC should outperform other flat plates, particularly in cold climates<sup>2</sup>

TRAINED

SHW INSTALLER IS CRITICAL  
To address unique features of SHW systems<sup>3</sup>

OVERHEATING PROTECTION WORKED

May decrease maintenance costs over time<sup>4</sup>

Modeled Energy Savings for HSTC in Locations with Different Solar Resources

Large loads are critical for positive ROI

City	Hot Water Load (gal/day)	System Unit Cost (\$/ft²)	Collector Area (ft²)	Solar Fraction*	Annual Energy Savings (kWh/yr)	Payback (years)	SIR
Seattle, WA cold/cloudy annual solar radiation 5.0 gigajoule/m²/yr	125	\$102	88	0.44	3,154	40.0	0.26
	500	\$102	175	0.32	8,937	26.8	0.56
	500	\$46	175	0.32	8,937	13.0	1.15
Indianapolis, IN cold/partly cloudy annual solar radiation 5.9 gigajoule/m²/yr	125	\$102	88	0.51	3,638	29.0	0.42
	500	\$102	175	0.38	10,448	19.2	0.81
	500	\$46	175	0.38	10,448	9.3	1.68
Denver, CO cold/sunny annual solar radiation 6.8 gigajoule/m²/yr	125	\$102	88	0.60	4,291	24.5	0.54
	500	\$102	175	0.44	12,343	16.2	0.98
	500	\$46	175	0.44	12,343	7.8	2.03
Phoenix, AZ warm/sunny annual solar radiation 8.5 gigajoule/m²/yr	125	\$102	88	0.54	2,757	21.4	0.50
	500	\$102	175	0.71	13,556	15.0	1.06
	500	\$46	175	0.71	13,556	7.3	2.20

\* The solar fraction represents the fraction of the total hot water energy load that is displaced by the solar hot water system

DEPLOYMENT

Where does M&V recommend deploying SHW?

ELECTRIC WATER HEATERS LARGE CONSISTENT LOADS

Natural gas prices in the U.S. are generally too low to make SHW cost-effective.

<sup>1</sup>High Performance Flat Plate Solar Thermal Collector Evaluation. Caleb Rockenbaugh, Jesse Dean, David Lovullo, Lars Lisell, Greg Barker, Ed Hancock, Paul Norton (NREL), July 2016 p.8 <sup>2</sup>Ibid, p.7 <sup>3</sup>Ibid, p.11 <sup>4</sup>Ibid, p.8